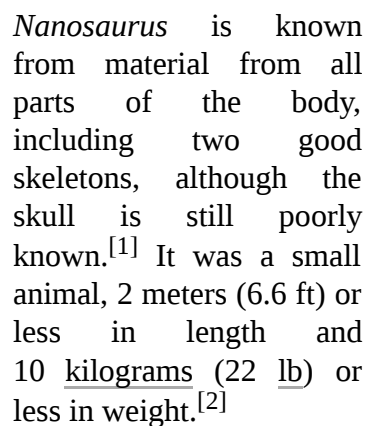


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## Description



<div><div><div><div><span></span></div><div><b>Nanosaurus</b></div></div></div><div></div><div>Temporal range: Late Jurassic,<span> </span><div><div></div><div>155–148<span> </span>Ma</div><div></div></div></div></div>											
PreЄ	Є	OS	D	C	P	T	J	K	PgN		
<div><div><div><span></span><div><div><span><span></span></span></div><div><div>Reconstructed skeleton cast of <i>Nanosaurus</i> (<i>Othnielosaurus</i>) <i>consors</i>, Dinosaur Journey Museum</div></div></div></div></div></div>											
Scientific classification											<span></span>
Kingdom:	Animalia										
Phylum:	Chordata										
Clade:	Dinosauria										
Order:	†Ornithischia										
Clade:	†Genasauria										
Clade:	†Neornithischia										
Family:	†Nanosauridae <div>Marsh, 1877b</div>										
Genus:	† <i>Nanosaurus</i> <div>Marsh, 1877a</div>										
Species:	† <i><b>N. agilis</b></i>										
Binomial name											
† <i><b>Nanosaurus agilis</b></i> <div>Marsh, 1877</div>											
Synonyms											
Genus synonymy											
<div><div><span>■</span></div><div><i>Drinker</i> Bakker <i>et al.</i>, 1990</div></div> <div><div><span>■</span></div><div><i>Othnielia</i> Galton, 1977</div></div>											

fingers. The head was small. It had small leaf-shaped cheek teeth (triangular and with small ridges and denticles lining the front and back edges), and premaxillary teeth with less ornamentation.<sup>[4]</sup>

Like several other neornithischian dinosaurs, such as *Hypsilophodon*, *Thescelosaurus*, and *Talenkauen*, *Nanosaurus* had thin plates lying along the ribs. Called intercostal plates, these structures were cartilaginous in origin.<sup>[5]</sup>

## History and taxonomy

### Marsh's original groundwork



Holotype dentary and ilium

In 1877, Marsh named two species of *Nanosaurus* in separate publications, based on partial remains from the Morrison Formation of Garden Park, Colorado. One paper described *N. agilis*, based on YPM 1913, with remains including impressions of a dentary, and postcranial bits including an ilium, thigh bones, shin bones, and a fibula.<sup>[6]</sup> The other paper named *N. rex*, a second species which

Marsh based on YPM 1915 (also called 1925 in Galton, 2007), a complete thigh bone.<sup>[4][7]</sup> He regarded both species as small ("fox-sized") animals.<sup>[7]</sup> A third species, *N. victor*, was named, which he soon recognized to be something completely different, and is now known as the small, bipedal crocodylomorph *Hallopus*.<sup>[6][8]</sup>

The next year, he named the new genus *Laosaurus* on material collected by Samuel Wendell Williston from Como Bluff, Wyoming. Two species were named: the type species *L. celer*, based on parts of eleven vertebrae (YPM 1875);<sup>[9]</sup> and the "smaller" *L. gracilis*, originally based on a back vertebra's centrum, a caudal centrum, and part of an ulna (review by Peter Galton in 1983 finds the specimen to now consist of thirteen back and eight caudal centra, and portions of both hindlimbs).<sup>[9][10]</sup> A third species, *L. consors*, was established by Marsh in 1894 for YPM 1882, which consists of most of one articulated skeleton and part of at least one other individual.<sup>[11]</sup> The skull was only partially preserved, and the fact that the vertebrae were represented only by centra suggests a partially grown individual. Galton (1983) notes that much of the current mounted skeleton was restored in plaster, or had paint applied.<sup>[10]</sup>



Othniel Charles Marsh's 1896 skeletal restoration of "Laosaurus" *consors* (now *Nanosaurus*).

### Galton's taxonomic revisions

These animals attracted little professional attention until the 1970s and 1980s, when Peter Galton reviewed many the "hypsilophodonts" in a series of papers. In 1973, he and Jim Jensen described a partial skeleton (BYU ESM 163 as of Galton, 2007) missing the head, hands, and tail as *Nanosaurus? rex*, which had been damaged by other collectors prior to description.<sup>[12]</sup> By 1977, he had concluded that *Nanosaurus agilis* was quite different from *N. rex* and the new skeleton, and coined *Othnielia* for the latter species. The paper (primarily concerning the transcontinental nature of *Dryosaurus*) considered *Laosaurus consors* and *L. gracilis* synonyms of *O. rex* without elaboration, and considered *L. celer* an invalid *nomen nudum*.<sup>[13]</sup>

- *Othnielosaurus* Galton, 2007

#### Species synonymy

- *Drinker nisti* Bakker *et al.*, 1990
- *Laosaurus consors* (Marsh, 1894)
- *Nanosaurus rex* (Marsh, 1877)
- *Othnielia rex* (Marsh, 1877)
- *Othnielosaurus consors* (Marsh, 1894)



Casts of *Nanosaurus (Othnielia) rex* mounted as if a herd running, Denver Museum of Nature and Science.

In 1990, Robert Bakker, Peter Galton, James Siegwarth, and James Filla described remains of a dinosaur they named *Drinker nisti*. The name is somewhat ironic; *Drinker*, named for renowned palaeontologist Edward Drinker Cope whose infamous "bone wars" with rival Othniel Charles Marsh produced many dinosaur fossils which are world-famous today, was described as a probable close relative of *Othnielia*, named for Marsh. The species name refers to the National Institute of Standards and Technology (NIST). Discovered by Siegwarth and Filla in upper Morrison Formation beds at Como Bluff, Wyoming, it was based on a partial subadult skeleton (listed as CPS 106 originally, then as Tate 4001 by Bakker

1996<sup>[14]</sup>) including partial jaws, vertebrae, and partial limbs. Several other specimens found in the same area were assigned to it, mostly consisting of vertebral and hindlimb remains, and teeth.<sup>[15]</sup> The holotype specimen's current location is unknown; according to Carpenter and Galton (2018), the previous two institutions reported to have had it did not ever curate the specimen, and the collection it was originally said to be in never existed at all.<sup>[14]</sup>

Several decades later, in his 2007 study of the teeth of Morrison ornithischians, concluded that the holotype femur of *Othnielia rex* is not diagnostic, and reassigned the BYU skeleton to *Laosaurus consors*, which is based on better material. As the genus *Laosaurus* is also based on nondiagnostic material, he gave the species *L. consors* its own genus, *Othnielosaurus*. As a result, in practical terms, what had been thought of as *Othnielia* is now known as *Othnielosaurus consors*. Regarding *Nanosaurus agilis*, Galton considered it a potentially valid basal ornithopod, and noted similarities to heterodontosaurids in the thigh bone. He tentatively assigned to it some teeth that had been referred to *Drinker*.<sup>[4][4]</sup>



Life restoration of *Nanosaurus (Othnielosaurus) consors*

Another decade later, in 2018, Galton, alongside Kenneth Carpenter, described a new ornithischian specimen. They found it very similar to the fragmentary holotype of *Nanosaurus*, but more clear in its anatomical features. Their new specimen was also found to display extreme similarity with the specimens of *Othnielosaurus* and *Drinker*. Due to the new data, they concluded that all three species, alongside *Othnielia*, represented the same animal, united under the name *Nanosaurus agilis*. This painted a new picture of a singular, very common small dinosaur known from a large amount of material.<sup>[14]</sup> This conclusion has been recognized by papers since, some of which incorporating the new, all-encompassing taxon into their phylogenetic analyses.<sup>[16][17][18]</sup>

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